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EXPERIMENT AND EXPERIENCE IN CROP ROTATIONS

By John M. MUNRO

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EXPERIMENT AND EXPERIENCE IN CROP ROTATIONS.

by
John M. Munro.

Increasing pressure of population in developing countries necessitates an increase in agricultural production. Traditional methods of shifting cultivation are unable to provide this while at the same time maintaining or increasing the fertility of agricultural land.

Many African countries base their cropping recommendations on a grass/arable rotation, first advocated in Uganda. The choice of crops and the order in which they are grown in the rotation are matters which can be decided relatively easily from short-term experiments and economic considerations.

Intercropping, cattle manure, artificial fertilizers, the economic value of grass, the effect of grazing on restoration of fertility and restorative crops other than grass are discussed.

The main difficulty facing the agricultural scientist is the assessment of the value of a rotation in maintaining fertility. Annual records from unreplicated plots or actual farm rotations are only useful when they are available over very long periods. Replicated rotation trials are very complex, and may not give statistically valid results until they have been running for many years. Only a few rotations can be included, and the need to include all phases of the rotation in any one season severely restricts replication. The rotations tested and the varieties used as indicator crops may be out of date before results are available. Few comprehensive trials have in fact been laid down and maintained.

A better knowledge of the principles involved in the decline and improvement of fertility is required so that trials may be simplified and their results may be of wider application. These principles may be studied by using three methods of approach - chemical, physical and climatological.

The chemical approach follows the cycle of the main nutrients through the rotation in the soil profile and the crops being grown; and the effect on these cycles of weathering, leaching and the addition of fertilizers.

The physical approach studies the texture and structure of the soil; the effect on these of different crops and manures, and how physical conditions affect the movement of moisture and nutrients in the soil and into the plant.

The climatological approach studies the acceptance of rainfall, the hydrological balance in the soil, and its effect on physical and chemical changes.

Elucidation of these principles should help to interpret the results of existing trials, allow the results of shorter-term trials to be integrated into a picture of wide applicability, and suggest new methods of maintaining an intensified agriculture.

